

Residential Septic System Failure and Rehabilitation with Vacuum Bubble[®] Technology (VBT[™]) - A Case Study

Introduction

Vacuum Bubble[®] Technology (VBT[™]) creates micro bubbles of air that are neutrally buoyant. The bubbles are created under a partial vacuum and, as a result, the internal pressure of the bubbles is lower than that of the surrounding water. Consequently, the bubbles collapse to an average dimension of 0.25 mm in diameter. Because of their small size and neutral buoyancy, the bubbles remain in the water for many minutes. These micro bubbles increase the oxygen transfer potential in the water which, in turn, enables aerobic bacteria to consume the organic waste in the water.

The Situation

A three bedroom home was built in southeastern Florida and a 'state of the art' septic system was installed. The system installation involved -

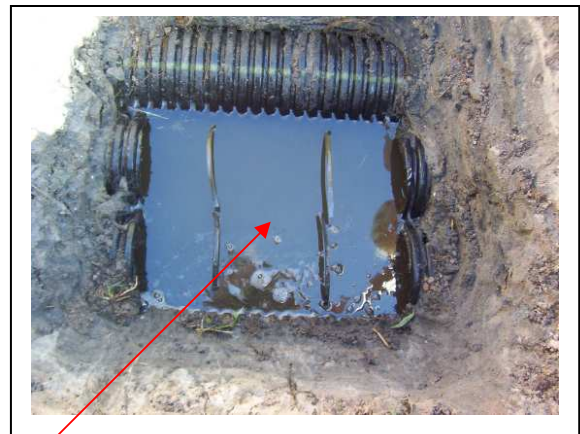
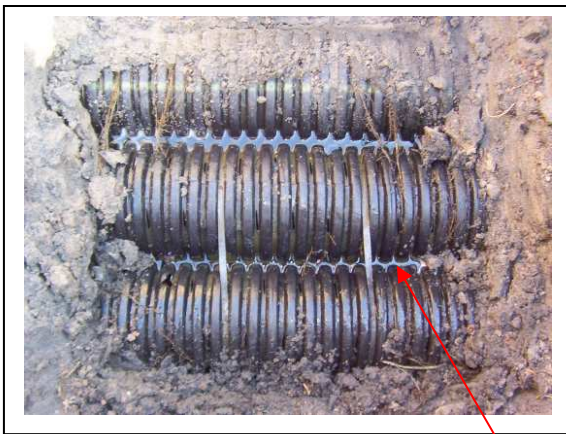
1. 1200 gallon septic tank with a Zabel 300 filter
2. Complete dig out to the water table
3. Palmdale sand was used as replacement material
4. Drainfield - 390 sq ft (16 bundles) of ADS multi-pipe system

For three years from installation of the septic system and the completion of the home, the Zabel filter was cleaned every 6 months. Generally there was minimal build up on the filter. A water meter was installed in the water supply line to the house and it averaged 100 – 125 gallons per day. All cooking grease was disposed of in the household trash. The washing machine soap used in this household was chlorine free

and great care was exercised in preventing the introduction of household cleaning chemicals into the system. The garbage disposal was not used and all food scraps were disposed in the household trash.

After three years of operation the tank was found to have a scum layer on the surface of the water that was highly odorous with a light tan color, granular in appearance and about 12 inches thick. There was very little sludge build up in the bottom of the tank.

Inspection ports were installed on the header and footer of the system and it was found that the drainfield was totally flooded.



Flooded Drainfield



Yellow slime and flocculant material in pipe

On excavation of a 12" x 12" section of the center of the drainfield the pipes were found to contain a yellowish slime and flocculant material. A sample of the raw water from the tank was taken and the results showed 0.25 mg/L of hydrogen sulfide and a pH of 7.41.

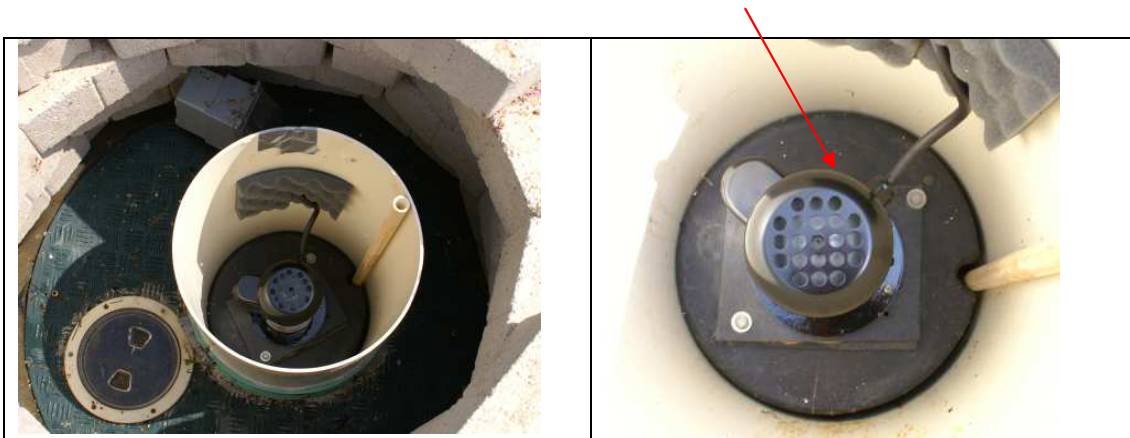
The Solution

The solution was the installation of a Model 101 VBT™ unit in the septic tank to recover the system (Florida Department of Health (FDOH) approved drain field repair). The VBT™ was installed in a float kit that allows for fluctuations in water levels in the tank without the risk of the motor running dry or of being submerged. The total cost of the installation was less than half the cost to replace the drainfield.

Views of the VBT™ installed in the float kit in the tank



VBT™ located on the float



Results

After four months of operation of the Model 101 VBT™, the drainfield at the upper level of the ADS multi-pipe system, and at the top of the palmdale sand was completely dry. The thick scum layer on the top of the septic tank was reduced to a thin layer that

partially covered the first compartment, and virtually no scum layer was present in the second compartment. There was still no appreciable sludge accumulation. The following photographs show the condition of the drainfield and sand layer before and after treatment with the Model 101 VBT™.

Before



Soil/sand samples from the drainfield showing loss of porosity and biomat loading

After



Sight tube at upper layer of ADS multi-pipe system.



Sight tube view of palmdale sand at base of ADS multi-pipe system.

Drainfield dry after installation of VBT™.

Improved water quality after installation of VBT™



The VBT™ has been operating in this septic system for over 4 years. There are no odors, the drainfield continues to be dry, there are no backups into the home, and there is no occurrence of ponding above the drainfield.

During the 4 years of operation the average cost to operate the VBT™ was \$50 per year. The VBT™ has not required any maintenance or repairs during the four years.